

REMARKS/ARGUMENTS

In the Final Office Action mailed April 22, 2010, claims 1-20 were rejected. In response, Applicants have amended claim 7. Applicants hereby request reconsideration of the application in view of the amendment and the below-provided remarks. No claims are added or canceled. No new matter has been added.

Claim Rejections under 35 U.S.C. 112

Claim 7 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Final Office Action states that the limitation “the first mono-crystalline emitter” of claim 7 lacks antecedent basis. Applicants appreciate the Examiner’s observation and have amended claim 7 to address the issue of antecedent basis. In particular, claim 7 is amended to refer to “the mono-crystalline emitter.” Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. 112, second paragraph, be withdrawn. Applicants respectfully request that the amendment be entered to put the claims in condition for allowance or in better condition for appeal.

Claim Rejections under 35 U.S.C. 103

Claims 1, 6-15, 17-21, and 25-30 were rejected based on one or more cited references. The cited reference(s) relied on in these rejections include:

Oda et al. (U.S. Pat. No. 6,482,710, hereinafter Oda)

Sato et al. (U.S. Pat. Pub. No. 2004/0056274 A1, hereinafter Sato)

Koshimizu et al. (U.S. Pat. Pub. No. 2005/0181569 A1, hereinafter Koshimizu)

Verma et al. (U.S. Pat. Pub. No. 2005/0079678 A1, hereinafter Verma)

Frei et al. (U.S. Pat. No. 6,509,242 B2, hereinafter Frei)

Asai et al. (U.S. Pat. No. 6,455,364 B1, hereinafter Asai)

In particular, claims 1-2, 4-5, 8-9, 11-12, 15, and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Oda in view of Sato. Claims 3, 10, and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over Oda and Sato, and further in view of Koshimizu. Claims 6, 13, and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Oda and Sato, and further in view of Verma. Claims 7, 14, and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Oda and Sato, and further in view of Frei. Claim 20 was rejected under 35 U.S.C. 103(a) as being unpatentable over Oda and Sato, and further in view of Asai. However, Applicants respectfully submit that these claims are patentable over Oda, Sato, Koshimizu, Verma, Frei, and Asai for the reasons provided below.

Independent Claim 1

Claim 1 recites:

“A method for growing a mono-crystalline emitter for a bipolar transistor, comprising:
providing a trench formed on a silicon substrate having opposed silicon oxide side walls;
selectively growing a highly doped first mono-crystalline layer on the silicon substrate in the trench;
forming an amorphous or polysilicon layer over the silicon oxide side walls; and
forming a second mono-crystalline layer over the first mono-crystalline layer;
wherein the amorphous or polysilicon layer and the second mono-crystalline layer are formed by non-selectively growing a second silicon layer over the trench”
(emphasis added).

In contrast, Oda does not teach forming a polysilicon layer over the silicon oxide and a second mono-crystalline layer over the first mono-crystalline layer by non-selectively growing a second silicon layer over the trench. In particular, Oda does not teach that both the second mono-crystalline layer and the polycrystalline layer are formed by growing a single layer. Rather, Oda teaches that a p-type single crystal layer 13 and a p-type intrinsic base layer 14 are formed in an opening of a multilayer film (Oda, col. 7, lines 39-43 and Fig. 5A). Oda further teaches depositing an emitter electrode 19 made of polysilicon over the p-type intrinsic base layer 14 (Oda, col. 7, lines 48-51 and Fig. 5C). However, the p-type intrinsic base layer 14 and the emitter electrode 19 of Oda are not formed by growing the same layer, but are formed in two different steps by growing two

separate layers. Therefore, Oda does not teach forming a second mono-crystalline layer over the first mono-crystalline layer by growing a second silicon layer over the trench, as recited in claim 1. Additionally, the Final Office Action does not assert that Sato might disclose the missing limitation of Oda.

For the reasons presented above, Oda and Sato, alone or in combination, do not teach all of the limitations of claim 1 because Oda and Sato do not teach forming a second mono-crystalline layer over the first mono-crystalline layer by non-selectively growing a second silicon layer over the trench, as recited in claim 1. Accordingly, Applicants respectfully assert that claim 1 is patentable over Oda and Sato, because Oda and Sato do not teach all of the limitations of claim 1.

Independent Claims 8 and 15

Independent claims 8 and 15 include similar limitations to claim 1. Although the language of claims 8 and 15 differs from the language of claim 1 and the scope of claims 8 and 15 should be interpreted independently of claim 1, Applicants respectfully assert that the remarks provided above in regard to claim 1 apply also to claims 8 and 15.

Dependent Claims 2-7, 9-14, and 16-20

Claims 2-7 are dependent on claim 1, claims 9-14 are dependent on claim 8, and claims 16-20 are dependent on claim 15. Applicants respectfully assert that claims 2-7, 9-14, and 16-20 are allowable based on allowable base claims. Additionally, each of claims 2-7, 9-14, and 16-20 may be allowable for further reasons.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the amendments and remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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